

**[0030]** FIG. 3 illustrates a schematic exploded perspective view illustrating an LED display apparatus, according to an exemplary embodiment;

**[0031]** FIG. 4 illustrates a schematic cross-sectional view and a schematic perspective view illustrating an optical element of an LED display apparatus, according to an exemplary embodiment;

**[0032]** FIG. 5A illustrates a schematic view illustrating an optical element and LEDs, according to an exemplary embodiment;

**[0033]** FIG. 5B illustrates a schematic view illustrating an optical element and LEDs, according to another exemplary embodiment;

**[0034]** FIG. 5C illustrates a schematic view illustrating an optical element and LEDs, according to yet another exemplary embodiment;

**[0035]** FIG. 6A illustrates a schematic front perspective view illustrating an LED display apparatus, according to another exemplary embodiment; and

**[0036]** FIG. 6B illustrates a schematic rear perspective view illustrating an LED display apparatus, according to yet another exemplary embodiment;

#### DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

**[0037]** Certain exemplary embodiments will now be described in greater detail with reference to the accompanying drawings. Further, a method for preparing and using the present disclosure will be described in greater detail with reference to the accompanying drawings. Like reference numbers refer to like parts, components, and structures.

**[0038]** Terms including an ordinal number, such as “first,” “second,” etc. may be used to explain various components, and the above-mentioned components are not limited to the above-mentioned terms. The above-mentioned terms may be used for the purpose of distinguishing one component from another. For example, a first component may be called a second component within the scope of rights of the present disclosure. Further, the second component may be called the first component.

**[0039]** The term “and/or” may include a combination of a plurality of recited items that are related to each other or any one of a plurality of recited items that are related to each other. Further, “film,” “sheet” or “plate” only differ in names, and may not be distinguished from one another.

**[0040]** Content may be displayed in a display apparatus. Content may be received in a control apparatus and/or a display apparatus. For example, content may include a video file reproduced in a video player, which is one of applications, or an audio file, a music file reproduced in a music player, a photo file displayed in a photo gallery, a webpage file displayed in a web browser, a text file, or etc. Further, content may include broadcast being received.

**[0041]** Terms used in the present disclosure are used to describe exemplary embodiments, and are not intended to limit and/or restrict the present disclosure. A singular term includes a plural form unless it is intentionally written that way.

**[0042]** The terms, “include,” “have” etc. of the description are used to indicate the existence of features, numbers, steps, operations, elements, parts or combination thereof, and do not exclude the possibilities of combination or addition of one or more features, numbers, steps, operations, elements,

parts or combination thereof. Like reference numbers refer to members that perform substantially the same function.

**[0043]** FIG. 1 is a schematic view illustrating an LED display apparatus, according to an exemplary embodiment. FIG. 1 shows that an LED display apparatus **100** is installed outdoors, but it would be readily understood by one of ordinary skill in the art that the LED display apparatus may be installed indoors according to another exemplary embodiment.

**[0044]** Referring to FIG. 1, the LED display apparatus **100** may be implemented as a billboard at a store, which displays merchants and/or price to provide information to customers.

**[0045]** The LED display apparatus **100** may include LEDs respectively emitting a red light, a green light and/or a blue light in a matrix form. Further, referring to FIG. 5A, the LED display apparatus **100** may package a red LED **11r**, a green LED **11g** and a blue LED **11b** to form one pixel, and arrange them in a matrix form. Each of the LEDs, i.e., a red LED **11r**, a green LED **11g** and a blue LED **11b** may be called a sub-pixel. Further, the LED display apparatus **100** may include an LED to emit a white color light and a color filter to extract various colors from the white color light.

**[0046]** The LED display apparatus **100** may include a screen formed by a plurality of LEDs. The LED display apparatus **100** may display content by driving a plurality of LEDs.

**[0047]** The LED display apparatus may provide a user with a good visibility due to its high brightness (for example, 2,500 nit). Further, the LED display apparatus **100** may have a waterproof and/or vibration-proof feature. The waterproof and/or vibration-proof feature may be determined with reference to an Ingress Protection rating.

**[0048]** The LED display apparatus **100** may be fixed to a wall by a wall mount unit or by a stand, depending on a distance between provided information (for example, advertisement) and the user and/or an eye level of the user.

**[0049]** The LED display apparatus **100** may include a plurality of LEDs **11** (see FIG. 2A), a plurality of LED modules **10** (see FIG. 2A) which display content using the plurality of LEDs **11**, and/or an LED cabinet **120** (see FIG. 2B) which supports the plurality of LED modules **10**. The LED cabinet **120** may transfer power and/or a driving signal to the LED modules **10** and/or the LEDs **11**. One LED module **10** or a plurality of LED modules **10** may be referred to as an LED panel **110**.

**[0050]** Although an LED display apparatus **100** including 2\*3 LED modules **10** is illustrated in FIG. 2A, it will be easily understood by one of ordinary skill in the art that the number and dispositional pattern of the LED modules **10** may be modified in various ways.

**[0051]** The LED display apparatus **100** and components of the LED display apparatus **100** will be described in greater detail below.

**[0052]** The LED display apparatus **100** may be implemented as a curved LED display apparatus having various curvatures. For example, the LED display apparatus **100** may have a screen having a fixed (or one) curvature (e.g., 2500 R), a plurality of curvatures (e.g., A first curvature of 2500 R and a second curvature of 3000 R). The LED display apparatus **100** may also be a curvature variable type LED display apparatus in which a curvature of a current screen changes according to a user input. However, it would be easily understood by those skilled in the art that examples of the LED display apparatus **100** are not limited thereto.